

# Work Order ID 71749

Monday, July 11, 2011 10:06:19 AM



Page 1

Item ID: D212-664-101

Accept



Setup Start



Revision ID: U/R

Stop



Item Name: Crosstube Fwd

Start Date: 7/11/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 7/28/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

*H*

Date:

*11-07-11*

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start



Stop



| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

Draw Nbr

Revision Nbr

*ECN*

D212-664-141

Rev D U/R

*OK 11.07.12*

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile and create labels as per PPP D212-664-101

CHG004

*CHG005*

*SEE ATTACHED*

*HJ Char BG 11-8-22*

*P/O*

110

0.00



Pick Kit

Packaging

Memo

0.00

Packaging

Packaging

*DP*

*11-8-15*

120

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D212-664-141 using CNC bender program 212-fw and Folio D212-664-101

*DP*

*11-8-15*



W/O: 71749

## WORK ORDER CHANGES

| DATE     | STEP | PROCEDURE CHANGE   | By | Date     | Qty | Approval<br>Chief Eng /<br>Prod Mgr | Approval<br>QC Inspector |
|----------|------|--|----|----------|-----|-------------------------------------|--------------------------|
| 11.07.12 | 220  | BOND SUPPORTS USING PROSEAL PER ATTACHED<br>PROCEDURE (EMAIL)<br>NOW CHG WOS | BT | 11-08-12 | 1   | CP<br>11.07.12<br>051042            | WJ<br>11-08-12           |
|          |      |  |    |          |     |                                     |                          |

Part No: D212-664-101 PAR #: \_\_\_\_\_ Fault Category: Landing Gear NCR: Yes ☒ No ☐ DQA: 11 Date: 11.08.23  
 Resolution: Rework Disposition: Return Rework QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

| NCR:     |      | WORK ORDER NON-CONFORMANCE (NCR)                  |                             |  |                |                           |                          |                          |
|----------|------|---|-----------------------------|--|----------------|---------------------------|--------------------------|--------------------------|
| DATE     | STEP | Description of NC<br>Section A                    | Corrective Action Section B |  |                | Verification<br>Section C | Approval<br>Chief Eng    | Approval<br>QC Inspector |
|          |      |   | Initial<br>Chief Eng        | Action Description<br>Chief Eng              | Sign &<br>Date |                           |                          |                          |
| 11.08.15 | 170  | Tube bent high (27.280")<br>RC: Process - bending | CP<br>11.08.15<br>051042    | Cut 1/8" FROM HIGHEST<br>CUFF.<br>Acceptable | 11-8-16        | JW<br>11-08-16            | CP<br>11.08.15<br>051042 | S<br>11/08/16            |
|          |      |   |                             |  |                |                           |                          |                          |
|          |      |   |                             |  |                |                           |                          |                          |

NOTE: Date &amp; initial all entries

## Chris Provencal

**From:** David Shepherd <dshepherd@dartaero.com>  
**Sent:** Wednesday, June 15, 2011 3:05 PM  
**To:** 'Chris Provencal'  
**Cc:** 'Mike Petsche'; 'Dan Stow'; 'Eric Downing'; 'Linda Lacelle'  
**Subject:** RE: Procedure for installing supports.

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Chris,

I agree with your procedure outlined below. It is our preference to leave the paint on the crosstube if we can for added corrosion protection (and for ease of manufacture). If Dan's final testing shows there is a big difference between a painted/unpainted crosstube, then we will switch to alodine only on the crosstube.

David

---

**From:** Chris Provencal [mailto:cprovencal@dartaero.com]  
**Sent:** Wednesday, June 15, 2011 11:24 AM  
**To:** 'David Shepherd'  
**Cc:** 'Mike Petsche'; 'Dan Stow'; 'Eric Downing'  
**Subject:** RE: Procedure for installing supports.

David,

Can I confirm that this is the agreed procedure for all newly manufactured tubes with off-center supports:

- Scuff paint under support, clean with MEK
- Completely remove any finish on support (if present), scuff bottom surface of support, clean with MEK
- Apply a 0.04" – 0.07" layer of Proseal 890 class B-2 on bottom of support and install wet.
- Install clamps and torque per dwg
- Clean up excess proseal
- Let cure for 72 hours after installation, recheck torque.

Chris

---

**From:** David Shepherd [mailto:dshepherd@dartaero.com]  
**Sent:** Tuesday, June 14, 2011 10:59 AM  
**To:** 'Chris Provencal'  
**Cc:** 'Mike Petsche'; 'Dan Stow'; 'Eric Downing'  
**Subject:** RE: Procedure for installing supports.

Made a couple of small changes.

- Remove finish on xtube in area of support down to alodine finish.
- Touch up alodine on xtube in affected area
- Completely remove any finish on support, scuff bottom surface of support
- Apply a 0.04" – 0.07" layer of Proseal 890 class B-2 on bottom of support and install wet.
- Install clamps and torque per dwg



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Start Date: 7/11/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 7/28/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

130

QC15- Crosstube Dimensional Check

0.00



QC

Memo

0.00

Quality Control

140

Crosstubes

0.00



Crosstubes

Memo

0.00

Crosstubes

1-Drill pilot holes in tube as per Dwg D212-664-141 using drill Jig DT8548 & DT8549, using drill table DT8577, set-up towers in hole #7 as per QSI 10

2-Ream hole to finish size in tube as per Dwg D212-664-141 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

3-Scribe part # and batch # using vibrating stylus as per Dwg D212-664-141

4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-141

Handwritten signature/initials

11-08-16

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Start Date: 7/11/2011 Start Qty: 1.00

Required Date: 7/28/2011 Req'd Qty: 1.00

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Cust Item ID:

Customer:

Approvals:

Process Plan: \_\_\_\_\_

Date: \_\_\_\_\_

Tooling: \_\_\_\_\_

Date: \_\_\_\_\_

QC: \_\_\_\_\_




Date: \_\_\_\_\_

SPC (Y/N): \_\_\_\_\_

Date: \_\_\_\_\_

Run Start

Stop

| Sequence ID/<br>Work Center ID   | Operation<br>Description   | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--|--|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 150<br><br>HandFXtube   | Crosstubes Chemical Conversion   | 0.00                 |         |        |              |               |               |                  |                |
|  | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Hand Finishing Crosstubes  | Chemical Conversion Coat within 24 hours of bending and drilling   |                      |         |        |              |               |               |                  |                |
| 160<br><br>QC          | QC5- Inspect part completeness to step on W/O  | 0.00                 |         |        |              |               |               |                  |                |
|  | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control  |  |                      |         |        |              |               |               |                  |                |
| 170<br><br>Outsource2 | Outsource process - NDT per QSI038 4.1   | 0.00                 |         |        |              |               |               |                  |                |
|  | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Outsource process - NDT  | Liquid Penetrant Inspection as per QSI 038<br>Issue P/O: 14697<br>LPI as per ASTM 1417 Level 2<br>Attach copy of NDT results to work order |                      |         |        |              |               |               |                  |                |

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Item Name: Crosstube Fwd

Start Date: 7/11/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 7/28/2011 Req'd Qty: 1.00

Customer:

Reference:

Run Start



Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

| Sequence ID/<br>Work Center ID | Operation<br>Description  | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|---|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 180<br>                        | Receive & Inspect for Damage & Mat'l Certs<br>Packaging         | 0.00                 |         |        |              |               |               |                  |                |
| Packaging                      | Memo  | 0.00                 |         |        |              |               |               |                  |                |
| Packaging                      | Ensure copy of NDT results attached to work order.              |                      |         |        |              |               |               |                  |                |
| 190<br>                        | QC5- Inspect part completeness to step on W/O                   | 0.00                 |         |        |              |               |               |                  |                |
| QC                             | Memo  | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                | Inspect for damage & ensure results are as per Dwg D212-664-141 |                      |         |        |              |               |               |                  |                |

CL 11108117 ①

25 11-06-12



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Item ID: D212-664-101

Accept



Setup Start



Revision ID: U/R

Stop



Item Name: Crosstube Fwd

Start Date: 7/11/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 7/28/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



| Sequence ID/<br>Work Center ID | Operation<br>Description  | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|---|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 200<br>                        | Spray Painting per QSI005 4.2   | 0.00                 |         |        |              |               |               |                  |                |
| SprayPaint                     |   |                      |         |        |              |               |               |                  |                |
|                                | <b>Memo</b>   | 0.00                 |         |        |              |               |               |                  |                |
| Spray Painting                 | 1-Prime inside and outside crosstube as per QSI 005 4.2                               |                      |         |        |              |               |               |                  |                |
|                                | 2-Paint outside crosstube as per DEO D212-667-141 with White Imron as per QSI 005 4.2 |                      |         |        |              |               |               |                  |                |
|                                | PRIME:  |                      |         |        |              |               |               |                  |                |
|                                | Start Time: _____   |                      |         |        |              |               |               |                  |                |
|                                | Finish Time: _____  |                      |         |        |              |               |               |                  |                |
|                                | PAINT:  |                      |         |        |              |               |               |                  |                |
|                                | Start Time: _____   |                      |         |        |              |               |               |                  |                |
|                                | Finish Time: _____  |                      |         |        |              |               |               |                  |                |
| 210<br>                        | QC14- Inspect Spray Paint   | 0.00                 |         |        |              |               |               |                  |                |
| QC                             |   |                      |         |        |              |               |               |                  |                |
| Quality Control                | <b>Memo</b>   | 0.00                 |         |        |              |               |               |                  |                |
|                                | Then, Wrap in plastic bag to protect from scratches                                   |                      |         |        |              |               |               |                  |                |

25 11-08-18

8 ulos 19

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Item ID: D212-664-101

Accept



Setup Start



Revision ID: U/R

Item Name: Crosstube Fwd

Stop



Start Date: 7/11/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 7/28/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

220

0.00



Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

2-Install supports with magnobond as per QSI 015 Adhere for 12 Hrs  
A/R 6398 Magnobond Batch: 118234★ USE PROSEAL  
SEE ATTACHED

3- Torque bolts as per dwg

85 11-08-17

230

0.00



QC

Quality Control

QC6- Inspect dimensions to drawing

Memo

0.00

11 08 22 (1)

240

0.00



Packaging

Pick Kit

Memo

0.00

Packaging

11 08 22 SP

**Work Order ID 71749**

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Item ID: D212-664-101

Accept



Setup Start



Revision ID: U/R

Item Name: Crosstube Fwd

Stop



Start Date: 7/11/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 7/28/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



| Sequence ID/<br>Work Center ID    | Operation<br>Description  | Set Up/<br>Run Hours      | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|-----------------------------------|---|---------------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 250<br><br>QC<br>Quality Control  | QC4- 100% Inspect kits for completeness<br><br>Memo                             | 0.00<br>8 ulos/27<br>0.00 |         |        |              |               |               |                  |                |
| 260<br><br>Packaging<br>Packaging | Packaging<br><br>Memo<br>Identify and pack for shipping as per PPP D212-664-101 | 0.00<br>Rco H<br>0.00     |         |        |              |               |               |                  |                |
| 270<br><br>QC<br>Quality Control  | QC21- Final Inspection - Work Order Release<br><br>Memo                         | 0.00<br>0.00              |         |        |              |               |               |                  |                |

11/8/23

11/8/23

ME  
11-08-23

# Picklist Print

Monday, July 11, 2011 10:06:26 AM

Page 1

Work Order ID: 71749

Parent Item: D212-664-101

Parent Item Name: Crosstube Fwd



Start Date: 7/11/2011

Required Date: 7/28/2011

Start Qty: 1.00

Required Qty: 1.00

## Comments:

IPP Rev:E 04.02.16 Reformat KJ/DS  
 IPP Rev:F 06-03-29 Remove Coments on Pick List JLM  
 IPP Rev:G 07-04-30 As per Rev C JLM IPP Rev:H  
 11.04.26 inspection strip ecn 11-549 EC verified by:DD

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D212-664-101TRN<br>             |                        | Manufactured  | No          |                     |                  | 110             | Each               | 2.0000         | 1           | 1            |               |                |        |
| Crosstube Turning Detail        |                        |               |             |                     |                  |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | <u>Location</u>     | <u>Loc Qty</u>   | <u>Loc Code</u> |                    |                |             |              |               |                |        |
|                                 |                        |               |             | FG046               | 2                |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | 71085               | 1                |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | 71086               | 1                |                 |                    |                |             |              |               |                |        |
| D3595-063-450<br>               |                        | Manufactured  | No          |                     |                  | 230             | Each               | 121.0000       | 4           | 4.210526     |               |                |        |
| RUBBER CUSHION                  |                        |               |             |                     |                  |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | <u>Location</u>     | <u>Loc Qty</u>   | <u>Loc Code</u> |                    |                |             |              |               |                |        |
|                                 |                        |               |             | LG                  | 121              |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | 67353               | 3                |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | 68893               | 6                |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | 70113               | 32               |                 |                    |                |             |              |               |                |        |
|                                 |                        |               |             | 71354               | 80               |                 |                    |                |             |              |               |                |        |

B72722



DD

11-8-15



BT

11-08-19

x4

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Parent Item: D212-664-101

Parent Item Name: Crosstube Fwd

Start Date: 7/11/2011

Required Date: 7/28/2011

Start Qty: 1.00

Required Qty: 1.00

MS21920-25

Purchased No

220 Each

136.0000 4 4



Clamp(per MIL-DTL-8783C)



RT 11-08-19

Location Loc Qty Loc Code

LG 100

113281 0

113282 0

118142 50

118183 50

LG050 36

116264 2

117998 34

x4

D2893-1

Manufactured No

220 Each

5.0000 2 2



2.75 Support



RT 11-08-19

Location Loc Qty Loc Code

LG052 5

70736 5

Manufactured No

240 Each

18.0000 1 1

D3428-1



Placard



11-08-22 SP

Location Loc Qty Loc Code

ST053 18

68920 8

71168 10

IX

# Picklist Print

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Work Order ID: 71749

Parent Item: D212-664-101

Parent Item Name: Crosstube Fwd

Start Date: 7/11/2011

Required Date: 7/28/2011

Start Qty: 1.00

Required Qty: 1.00

AN6-35A Purchased No 240 Each 47.0000



4 4  
sp 11-08-22

Location Loc Qty Loc Code

ST343 47

~~117441~~ 22

117872 25

AN6-36A Purchased No 240 Each 53.0000



4 4  
4x  
sp 11-08-22

Location Loc Qty Loc Code

ST343 53

117441 33

118012 20

MS21042L6 Purchased No 240 Each 329.0000



6 6  
sp 11-08-22

Location Loc Qty Loc Code

ST300 329

117343 29

117677 200

118078 100

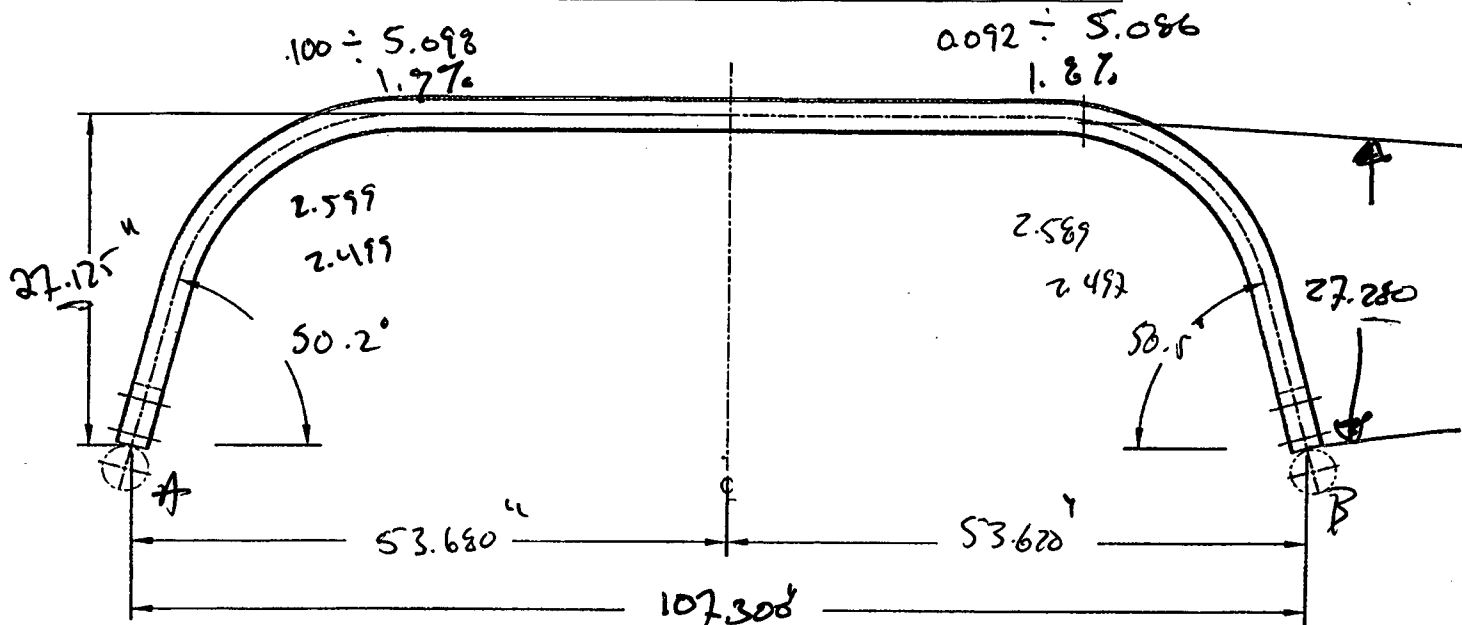
AN960JD616 NAS1149D0663J Purchased No 240 Each 0.0000



18 18  
m118378  
sp 11-08-22

|   |  |              |              |
|---|--|--------------|--------------|
| DART AEROSPACE LTD                            |  | Work Order:  | 71749        |
| Description: Crosstube High Fwd (205/212/412) |  | Part Number: | D212-664-101 |
| Inspection Dwg: D212-664-141 Rev: D           |  | Page 1 of 1  |              |

| Required Dimension | Min    | Max   |
|--------------------|--------|-------|
| Height             | 26.79  | 27.05 |
| 1/2 Span           | 53.59  | 53.85 |
| Angle              | 49     | 52    |
| Total Span         | 107.18 | 107.7 |



| Comments                           |
|------------------------------------|
| Sine A = 1.97% crushing @ 4 passes |
| Sine B = 1.8% crushing @ 8 passes  |

|                 |         |
|-----------------|---------|
| QC15 Inspection |         |
| Date            | 6/10/16 |

| Rev | Date     | Change                           | Revised by | Approved |
|-----|----------|----------------------------------|------------|----------|
| A   | 07.02.06 | New Issue                        | KJ/JM      |          |
| B   | 07.05.31 | Dimensions updated per Dwg Rev C | KJ/JM      |          |
| C   | 10.04.01 | Dwg Rev updated                  | KJ         |          |

D212-664-101      ECN 11-614  
#749

8      7      6      5      4      3      2      1



| Item | Qty<br>-141 | Qty<br>-141B | Part Number    | Description   |
|------|-------------|--------------|----------------|---|
| 1    | X           |              | D212-664-141   | CROSSTUBE ASSEMBLY (205/212/412 HIGH FWD)   |
| 2    |             | X            | D212-664-141B  | CROSSTUBE ASSEMBLY (214 HIGH FWD)   |
| 3    | 1           | 1            | D6005-128      | CROSSTUBE   |
| 4    | 2           | 2            | D2893-1        | SUPPORT   |
| 5    | 4           | 4            | D3595-063-450  | RUBBER CUSHION  |
| 6    | 4           | 4            | MS21920-25     | CLAMP (OR MS21920-26)   |
| 7    | A/R         | A/R          | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023<br>ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,<br>TYPE II, CLASS 2 ADHESIVE) |

**GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6005-128  
FINISHED LENGTH = 126.514±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF  
USING VIBRATING STYLUS
- 7) WEIGHT: D212-664-141 = 33.6 lbs (PER IIN-D212-664)  
D212-664-141B = 33.6 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 3 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS  
6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF  
D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER  
INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1  
SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE  
SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE  
SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR  
DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND  
MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT  
HAS NOT BOTTOMED-OUT AFTER TORQUING.

REMOVED FROM UNDER REVIEW PER  
**UNDER REVIEW** ECN 11-614  
11.06.15  
FOR PRO-DEALING SUPPORT 11.07.26

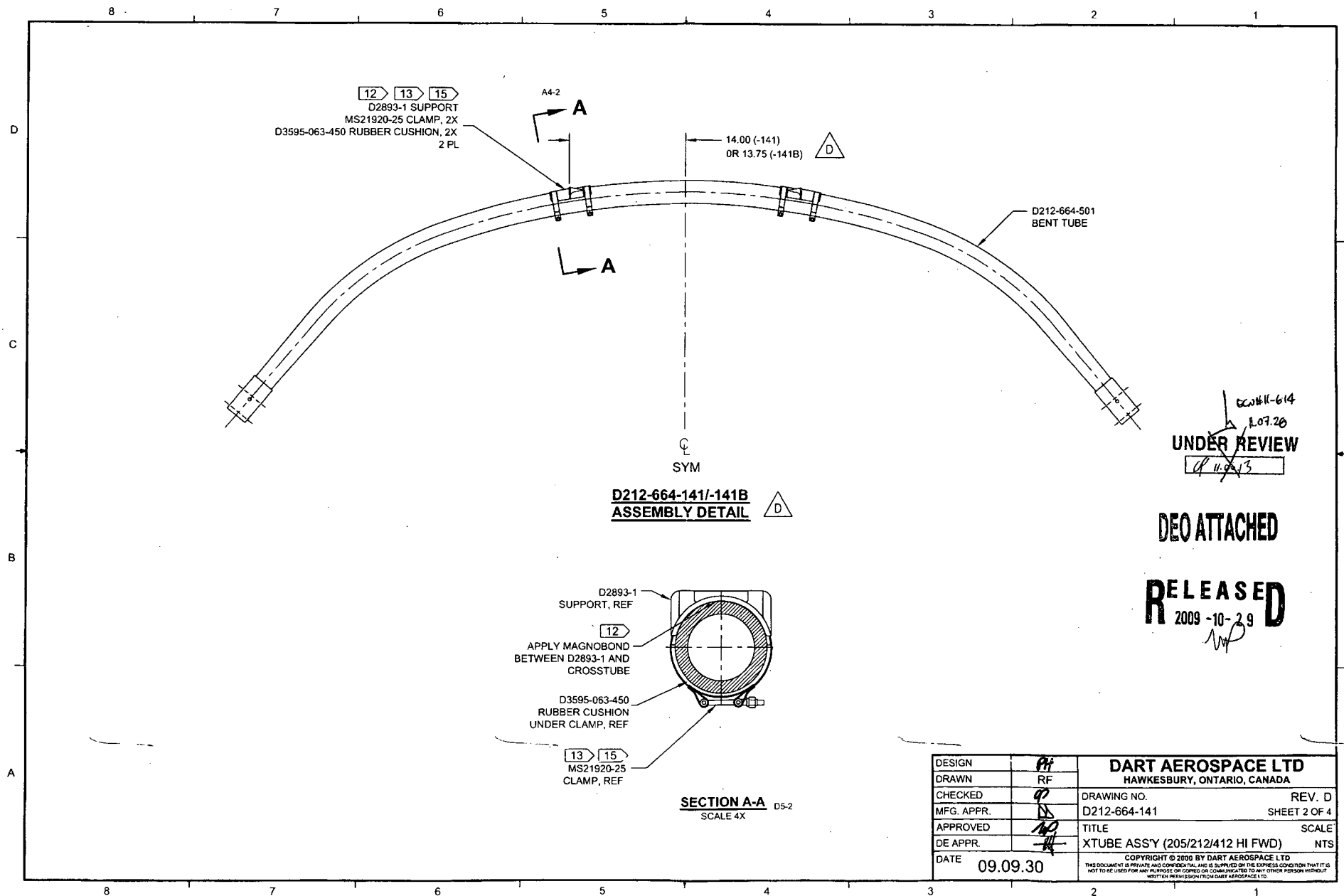
**DEO ATTACHED**

**RELEASED**  
R 2009-10-29  
N/A

|            |  |  |              |
|------------|--|--|--------------|
| D          | REFORMAT/REVISE GENERAL NOTES/PART LIST;<br>REORGANIZED VIEWS AND REFORMATTED DRAWING<br>TO CURRENT STANDARDS; ADD -141B (ZN B4-2, D4-2);<br>REMOVED REF & ADD TOLERANCES (ZN B4-3, C6-3, C8-3<br>& B6-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3);<br>MOVED TURNING DETAIL & UPDATED TOLERANCE TO<br>SHEET 4 | RF   | 09.09.30     |
| C          | REMOVE -851 ABRASION STRIP; ADD MAGNOBOND<br>6398, CUSHION, REVERSE CLAMPS   | PH   | 07.03.08     |
| B          | ADD HOLES FOR COMPATABILITY WITH BHT/AA<br>SKIDTUBES   | PH   | 05.02.04     |
| A          | NEW ISSUE  | PH   | 00.12.12     |
| REV.       | DESCRIPTION  | BY   | DATE         |
| DESIGN     | PH   | <b>DART AEROSPACE LTD</b><br>HAWKESBURY, ONTARIO, CANADA   |              |
| DRAWN      | RF   | DRAWING NO.  | REV. D       |
| CHECKED    | PH   | D212-664-141   | SHEET 1 OF 4 |
| MFG. APPR. | PH   | TITLE  | SCALE        |
| DE APPR.   | PH   | XTUBE ASSY (205/212/412 HI FWD)  | NTS          |
| DATE       | 09.09.30   | COPYRIGHT © 2000 BY DART AEROSPACE LTD<br>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS UNDERSTANDING THAT IT IS<br>NOT TO BE USED FOR ANY PURPOSES OR FOR DISSEMINATION TO ANY OTHER PERSON WITHOUT<br>WRITTEN PERMISSION FROM DART AEROSPACE LTD. |              |

8      7      6      5      4      3      2      1





|                             |  |        |   |               |                                |                           |              |
|-----------------------------|--|--------|---|---------------|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-141 | TITLE<br>XTUBE ASSY (205/212/412 HI FWD) | REV. D | DART AEROSPACE LTD<br>ENGINEERING ORDER |               | D.E.O. NO.<br>D212-664-141-D-1 | SHEET NO.<br>SHEET 1 OF 2 | SCALE<br>NTS |
| DRAWN                       | CHECKED                                  | UP     | MFG. APPR.                              | APPROVED      | DE APPR.                       |                           |              |
| DATE 11.04.07               | DATE 11.07.11                            |        | DATE 11.04.12                           | DATE 11/04/12 | DATE 11.04.12                  |                           |              |

**PURPOSE:**

ADD AN INSPECTION WINDOW TO UNDERSIDE OF CROSSTUBE.

**CHANGE:**

NOTES 2 OF SHEET 1 IS AMENDED AS FOLLOWS:

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA) AND  
PAINT OUTSIDE PER DART QSI 005 4.2  
REMOVE MASKING AND APPLY CLEAR COAT

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2

**RELEASED**  
2011-04-18

**UNDER REVIEW**

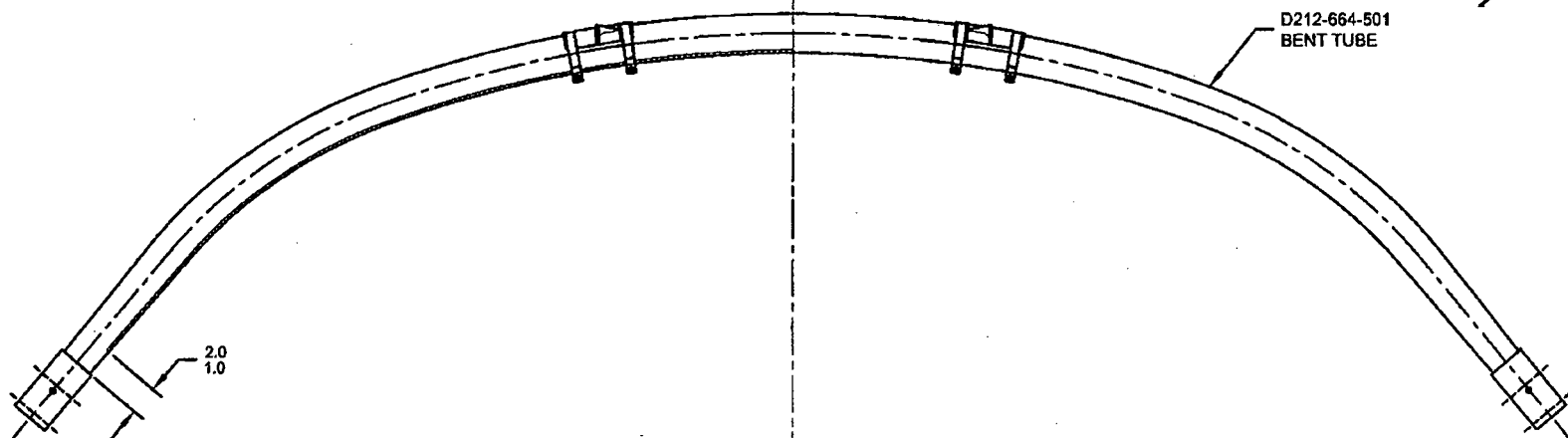
11/06/13  
D212-664  
11.07.28

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|                             |  |                     |   |                     |                                |                           |              |
|-----------------------------|--|---------------------|---|---------------------|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-141 | TITLE<br>XTUBE ASSY (205/212/412 HI FWD) | REV. D              | DART AEROSPACE LTD<br>ENGINEERING ORDER |                     | D.E.O. NO.<br>D212-664-141-D-1 | SHEET NO.<br>SHEET 2 OF 2 | SCALE<br>NTS |
| DRAWN                       | CHECKED <i>GP</i>                        | MFG. APPR. <i>E</i> | APPROVED <i>WPD</i>                     | DE APPR. <i>WPD</i> |                                |                           |              |
| DATE 11.04.07               | DATE 11.04.11                            | DATE 11.04.12       | DATE 11/04/12                           | DATE 11.04.12       |                                |                           |              |

**IS:**



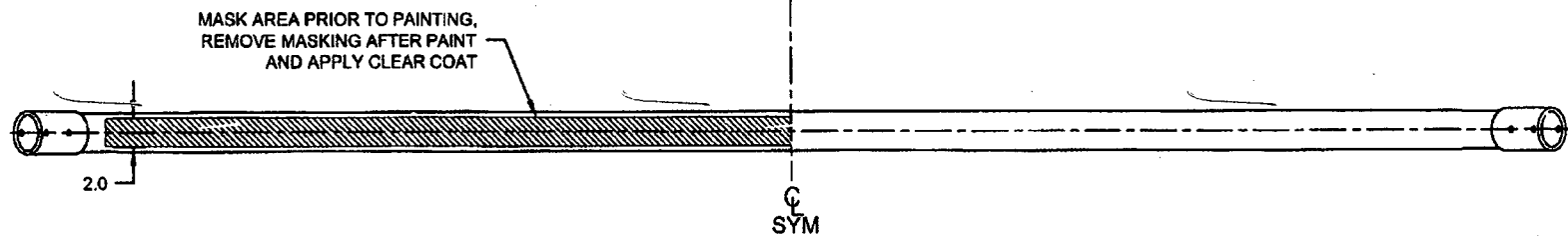
**WAS:**

**UNDER REVIEW**

*GP 11/06/13*

*ECN# 11-614*  
*11.07.28*

**D212-664-141/-141B**  
**ASSEMBLY DETAIL**



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|                             |                                       |                      |   |  |                                |                           |              |
|-----------------------------|---------------------------------------|----------------------|---|--|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-141 | TITLE<br>CROSSTUBE ASS'Y (205 HI FWD) | REV. D               | <b>DART AEROSPACE LTD<br/>ENGINEERING ORDER</b> |  | D.E.O. NO.<br>D212-664-141-D-2 | SHEET NO.<br>SHEET 1 OF 1 | SCALE<br>NTS |
| DRAWN <i>UP</i>             | CHECKED <i>ASS</i>                    | MFG. APPR. <i>AB</i> | APPROVED <i>MD</i>                              |  | DE APPR. <i>HA</i>             |                           |              |
| DATE 11.07.15               | DATE 11.07.20                         | DATE 11.07.21        | DATE 11/07/21                                   |  | DATE 11.07.21                  |                           |              |

**PURPOSE:**

REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

IS:

| Item | Qty<br>-141 | Qty<br>-141B | Part Number     | Description                   |
|------|-------------|--------------|-----------------|-------------------------------|
| 7    | A/R         | A/R          | PROSEAL 890 B-2 | SEALANT, AMS-S-8802 CLASS B-2 |

WAS:

|   |     |     |                |   |
|---|-----|-----|----------------|---|
| 7 | A/R | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023<br>ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,<br>TYPE II, CLASS 2 ADHESIVE) |
|---|-----|-----|----------------|---|

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

12) TO INSTALL D2893-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.

15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.

15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED  
 2011-07-28  
 22



Dart Aerospace Ltd.  
1270 Aberdeen Street  
Hawkesbury, ON K6A 1K7  
Tel: 613 632 5200  
Fax: 613 632 5246

## SHIPPING PICKLIST

Shiplist ID : PL107067  
Shiplist Date : 8/22/2011  
Sales Order ID : SO105799  
Customer POID : 11547/5112632

Page Number : 1 of 1

Bill To :  
DART HELICOPTERS SERVICES LLC.  
1736 ORD WAY  
OCEANSIDE, CA 92056  
US

CU-DAR001

Ship To :  
MECANEX USA INC.  
119 WHITE OAK DRIVE  
BERLIN, CT 06037  
US  
860 828 6531

Buyer: Contact Name: Ship From: MAIN WAREHOUSE  
Order Date: 8/19/2011 1:58:23 PM Contact Phone: 860 828 6531 DART AEROSPACE LTD  
Partial Ship: Yes Contact Phone Ext.: 1270 ABERDEEN  
FOB: Origin HAWKESBURY, ON K6A 1K7 CANADA  
Ship From Phone: 613 632 5200

| Line Nbr | Item ID<br>Name        | Item Repl ID | Rev Level<br>Harmonize Code: | Req Date<br>Promise Date  | Req Qty/<br>Sales U/M | To Pick Qty/<br>Stock U/M | Backorder Qty  | Primary/<br>Last Location | Picked Qty | Emp ID |
|----------|------------------------|--------------|------------------------------|---------------------------|-----------------------|---------------------------|----------------|---------------------------|------------|--------|
|          | Customer Item ID       |              |                              | Line Description          |                       |                           |                |                           |            |        |
| 1        | D2126-0720<br>Seal     |              | 4016.93                      | 8/22/2011<br>8/22/2011    | 5.0000<br>Each        | 5.0000<br>Each            | 5.0000<br>Each |                           |            |        |
|          | L7 8/22/2011<br>messes |              |                              | Ship Method: Fedex Ground |                       |                           |                |                           |            |        |
| 2        | D3236-1<br>Window      |              | 3825.30                      | 8/22/2011<br>8/22/2011    | 5.0000<br>Each        | 5.0000<br>Each            | 5.0000<br>Each |                           |            |        |
|          |                        |              |                              | Ship Method: Fedex Ground |                       |                           |                |                           |            |        |

| Warehouse      | Location | Lot Nbr | Loc Qty | Loc Code | Shelf Life | Change # | QC21 |
|----------------|----------|---------|---------|----------|------------|----------|------|
| Main Warehouse | ST217    |         | 4       |          |            |          |      |
|                |          | 65870   | 4       |          |            |          | QC21 |

Special Inst:

Sales Order Revision: 2

Thank You!

**ACUREN****LIQUID PENETRANT TEST REPORT**

P- 05100

PAGE 1 OF 1

CLIENT DART AEROSPACE DATE August 17<sup>th</sup> 2011 TIME AM ☒ PM ☐

ATTENTION LINDA LACELLE ACUREN JOB NO. 188-11-02343

ADDRESS 1270 ABERDEEN RD PO/VO No. 14697

HAWKESBURY, ONT WORK LOCATION Shop

PROJECT PT WET FLUORESCENT ON 8 CROSSTUBES ACCEPTANCE STD. ASTM 1417/ASL-038 REV./DATE 2005

ITEM(S) EXAMINED 8 CROSSTUBES AS LISTED BELOW

OB DESCRIPTION PROCEDURE NO. LT-002 REV./DATE 2008 TECHNIQUE NO. LT-002 REV./DATE 2008

PART NO. LISTED BELOW MATERIAL ALODINE ALUMINUM THICKNESS

SCOPE PERFORMED A WET FLUORESCENT L.P.I. on 100% of the EXTERNAL SURFACE ON ALL ITEMS LISTED BELOW

**TEST DETAILS**

|                  |   |   |   |  |  |
|------------------|---|---|---|--|--|
| METHOD           | <input checked="" type="checkbox"/> FLUORESCENT | <input type="checkbox"/> VISIBLE            | <input checked="" type="checkbox"/> WATER WASH  | <input type="checkbox"/> SOLVENT REMOVABLE                     | <input type="checkbox"/> POST EMULSIFIED |
| AMILY BRAND      | <u>MAGNAFLUX</u>                                |   | BLACK LIGHT S/N <u>13748</u>  | <input type="checkbox"/> OUTPUT > 1000 $\mu$ W/cm <sup>2</sup> | <input type="checkbox"/> AMBIENT < 2 fc  |
| ENETRANT         | <u>ZL-67</u>                                    | MINIMUM DWELL TIME <u>30</u> MIN.           | LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT | <input type="checkbox"/> OUTPUT > 100 fc @ SURFACE             |  |
| ENETRANT REMOVER | <u>H<sub>2</sub>O</u>                           | MINIMUM DRY TIME <u>&gt;10</u> MIN.         | OTHER   |  |  |
| DEVELOPER        | <u>SKD 32</u>                                   | MINIMUM DWELL TIME <u>10</u> MIN.           | LIGHT METER S/N <u>11/A</u>   | CAL DUE DATE <u>Aug/30/2011</u>                                |  |
| DEVELOPER TYPE   | <input type="checkbox"/> NON AQUEOUS            | <input checked="" type="checkbox"/> AQUEOUS | <input type="checkbox"/> DRY  |  |  |

**TEST SURFACE**

|                     |  |   |   |                                       |  |
|---------------------|--|---|---|---------------------------------------|--|
| SURFACE CONDITION   | <input type="checkbox"/> AS GROUND     | <input type="checkbox"/> AS WELDED                | <input type="checkbox"/> MACHINED                           | <input type="checkbox"/> SHOT BLASTED | <input checked="" type="checkbox"/> CLEAN BARE METAL |
| SURFACE TEMPERATURE | <input type="checkbox"/> < - 4°C/ 20°F | <input type="checkbox"/> - 4°C/ 20°F TO 10°C/50°F | <input checked="" type="checkbox"/> 10°C/50°F TO 52°C/125°F | <input type="checkbox"/> > 52°C/125°F |  |

**RESULTS-** (☐ METRIC ☐ IMPERIAL)

|   |     |       |   |
|---|-----|-------|---|
| 1 | W.O | 71753 | ✓ |
| 2 | W.O | 71749 | ✓ |
| 3 | W.O | 71750 | ✓ |
| 4 | W.O | 72761 | ✓ |
| 5 | W.O | 72760 | ✓ |
| 6 | W.O | 72716 | ✓ |
| 7 | W.O | 72679 | ✓ |
| 8 | W.O | 72678 | ✓ |

ITEM: 1 D407-667-105

2 D212-664-101

3 D212-664-101

4 D212-664-101

5 D212-664-101

6 D212-664-101

7 D212-664-101

8 D212-664-101

NO RELEVANT INDICATIONS DETECTED  
AT THE TIME OF INSPECTION

PT 11 08 17

**Scope of Services**

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

**Standard of Care**

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

**SIGNATURES**

|                                |                        |                     |
|--------------------------------|------------------------|---------------------|
| CLIENT REPRESENTATIVE          | <u>Jan Titley</u>      | DTR #               |
| TECHNICIAN (SIGNATURE):        | <u>Sebastien Dault</u> | REPORT REVIEWED BY: |
| NAME (PRINT):                  | <u>SEBASTIEN DAULT</u> | NAME INITIALS       |
| CGSB LEVEL <u>II</u> SNT LEVEL | CGSB LEVEL SNT LEVEL   |                     |
| CGSB REG. No <u>12959</u>      | CGSB REG. No           |                     |

WHITE - CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY

PT Sept 2005